

December 2002

Rogue River Sediment Quality Evaluation

ABSTRACT

This evaluation was conducted following procedures set forth in the Inland Testing Manual² and the Ocean Disposal Testing Manual (Green Book)³, developed jointly by the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency to assess dredged material. Guidelines used are those developed to implement the Clean Water Act⁴ and the Marine Protection, Research and Sanctuary Act⁵. These guidelines and associated screening levels are those adopted for use in the Dredge Material Evaluation Framework (DMEF) for the Lower Columbia River Management Area, November 1998¹.

On August 21, 2002 seven (7) surface grab sediment samples were collected from the Rogue River Project (RRP) channel and Gold Beach boat basin, samples RR-P-1 through RR-P-7. All seven (7) samples were submitted for physical analyses including total volatile solids (TVS). Samples 1 - 4 were analyzed for metals (9 inorganic), total organic carbon, pesticides and polychlorinated biphenyls, phenols, phthalates, miscellaneous extractables, and polynuclear aromatic hydrocarbons.

None of the contaminants tested were found to be at or above their SL except for nickel (Ni). Levels of nickel exceed the SL (140 ug/kg), with an average of 220 ug/kg. However, these levels are consistent with those taken in 1992¹¹ and 1997⁷ sampling events. Nickel levels have historically been higher in Rogue River sediments than in other coastal estuaries. For purposes of this report, these levels are considered background levels for the Rogue River.

All sediment is determined to be suitable for unconfined, in-water placement without further characterization.

INTRODUCTION

This report characterizes the sediment to be dredged at the Rogue River Project for the purposes of dredging and disposal. The sampling and analysis objectives are stated in the Sampling and Analysis Plan (SAP August 2002), and are listed below. This report will outline the procedures used to accomplish these objectives.

Project Site Location and Description

The Rogue River discharges into the Pacific Ocean 32 miles north of the California State border. The drainage basin is 5,100 mi² and is the largest of Oregon's coastal rivers. The authorized Federal Project at the mouth of the Rogue consists of a channel 13 feet deep and 300 feet wide (see Figure 3). It runs from deep water in the ocean for approximately 3,500 feet to the entrance of the Gold Beach boat basin access channel. The boat basin access channel is 10 feet deep and 150 feet wide into the boat basin. The entrance to the basin

was relocated after the 1997 testing event to avoid a large shoal that develops during spring and summer between the north and south jetties.⁹

Sampling and Analysis Objectives

- Characterize sediments in accordance with the regional dredge material testing manual, the Dredge Material Evaluation Framework for the Lower Columbia River Management Area (DMEF; to be expanded to include all of Oregon).
- Collect, handle and analyze representative sediment of the proposed dredging prism, in accordance with protocols and Quality Assurance/Quality Control (QA/QC) requirements.
- Characterize sediments to be dredged for evaluation of suitability of inwater disposal.
- Conduct physical and chemical characterization only for this sediment evaluation, unless DMEF screening levels are exceeded and further characterization (Tier III Biological Assays) is needed to determine disposal method.

PREVIOUS STUDIES

The sediment of the Rogue River project was evaluated in 1982¹⁰, 1992⁶, and 1997⁷. In 1982 the sediment at the mouth was composed of very coarse sand with some gravel and cobbles with a volatile content less than 2.0%. The volatile content of the samples taken from the boat basin access channel were roughly 4.0 to 8.0%.

Results from the 1992 tests showed concentrations of potential contaminants in bulk sediment and elutriates below established concern levels. There were no known sources of contaminants in the nearby area. The sediment was judged acceptable for unconfined in-water and upland disposal according to regulations promulgated in section 102 and 103 of the Marine Protection Research And Sanctuaries Act (MPRSA) and section 404 of the clean Water Act (CWA).

1997 physical and chemical analyses of the sediment confirm earlier studies and indicate that Rogue River sediment had not degraded significantly. The material, except for the fine-grained inner harbor sediments, was similar to that at the offshore ODMDS and beach disposal site. This and previous sediment quality evaluations have concluded that no unacceptable, adverse environmental impacts would be expected from its disposal.

CURRENT SAMPLING EVENT/DISCUSSION

A total of seven (7) sediment samples were collected from the Rogue River Federal Project on August 21, 2002 (see Figures 1 and 2). The samples were collected using a Ponar sampling device. All seven (7) samples were submitted for physical analyses including total volatile solids (TVS). Samples 1 - 4 were also analyzed for metals (9 inorganic), total organic carbon (TOC), pesticides and polychlorinated biphenyls (PCBs), phenols, phthalates, miscellaneous extractables, and polynuclear aromatic hydrocarbons (PAHs).

Table 1. Sample Location Coordinates

RR-P-01	42° 25.298 N 124° 25.244 W
RR-P-02	42° 25.355 N 124° 25.151 W
RR-P-03	42° 25.452 N 124° 25.206 W
RR-P-04	42° 25.509 N 124° 25.369 W
RR-P-05	42° 25.473 N 124° 25.522 W
RR-P-06	42° 25.326 N 124° 25.780 W
RR-P-07	42° 25.227 N 124° 25.960 W

RESULTS

Physical and Volatile Solids (TVS) (ASTM methods): Samples 1- 7 were submitted for physical and TVS analyses and the data is presented in Table 2.

- Mean grain size for all samples is 2.02 mm, with 16.54% gravel, 58.48% sand, 24.99% fines, and 3.67% Volatile solids.

Metals, Total Organic Carbon (EPA method 6020/7471, EPA method 9060): Samples 1 - 4 were submitted for testing and the data is presented in Table 3.

- The concentration of all metals except for nickel (Ni) is below established concern levels¹ in all samples. Levels of nickel exceed the SL by an average of 57%. Nickel levels have historically been higher in Rogue River sediments than in other coastal estuaries. Current results compare to those taken in 1992¹¹ and 1997⁷. Historically high levels of AVS will help bind heavy metals and reduce their toxicity⁶.
- TOC ranged from 4,850 to 22,000 mg/kg in the samples.

Pesticides/PCBs, Phenols, Phthalates and Miscellaneous Extractables (EPA method 8081A/8082, EPA method 8270): Samples 1 - 4 were tested and the data are presented in Table 4.

- Total DDT was not detected above the SL in all four (4) samples. Samples 1 and 2 showed levels of 4,4'-DDE, a breakdown product of DDT, above the MDL (Method Detection Limit), but below the PQL (Practical Quantification Limit). Samples 3 and 4 showed no PCBs or pesticides (including DDT) at the MDL.
- The compound phenol was detected in all four (4) samples, with a maximum level of 3% of SL in Sample 1. One (1) phthalate was detected in Samples 1 – 4, falling well below the SL. Benzoic acid and dibenzofuran were found to be below the MDL in all four (4) samples.

Polynuclear Aromatic Hydrocarbons (EPA method 8270C): Samples 1 – 4 were tested and the data is presented in Tables 5 and 6.

- Very low levels of some individual low molecular weight PAHs were found ranging from 0.07% to 1.1% of the SL. The highest was 2-methylnaphthalene at 1.1% of the SL.
- Low levels of most high molecular weight PAHs were found in all four (4) samples ranging from 0.10% to 0.55% of the SL.

CONCLUSION

Collection and evaluation of the sediment data were completed using guidelines from the Dredge Material Evaluation Framework for the Lower Columbia River Management Area (DMEF). The DMEF is a regional manual developed jointly with regional EPA, Corps, Oregon Department of Environmental Quality and Washington Departments of Ecology and Natural Resources. The screening levels used are those adopted for use in the DMEF, final November 1998. The DMEF tiered testing approach requires that material in excess of 20% fines and greater than 5% volatile solids, as well as any material with prior history or is suspected (“reason to believe”) of being contaminated, be subjected to chemical as well as physical analysis.

A total of seven (7) sediment samples were collected from the Rogue River Federal channel and the boat basin entrance channel on August 21, 2002. Physical analyses were run on each sample and chemical analyses were run on Samples 1 - 4. Samples 5 – 7 were excluded from chemical testing because samples were composed of coarse grained sediments with at least 80% sand and less than 5.0% TVS.

None of the contaminants tested were found to be at or above their SL except for nickel (Ni). Levels of nickel exceed the SL (140 ug/kg), with an average of 220 ug/kg. However, these levels are consistent with those taken in 1992¹¹ and 1997⁷ sampling events. Nickel levels have historically been higher in Rogue River sediments than in other coastal estuaries. For purposes of this report, these levels are considered background levels for the Rogue River Federal Project.

All sediment is determined to be suitable for unconfined, in-water placement without further characterization.

REFERENCES

1. U.S. Army Corps of Engineers, Portland District and Seattle District; U.S. Environmental Protection Agency, Region 10; Oregon Department of Environmental Quality; Washington State Department of Natural Resources and Department of Ecology. 1998 Final Dredge Material Evaluation Framework for the Lower Columbia River Management Area.
2. U.S. Army Corps of Engineers, U.S. Environmental Protection Agency. February 1998. Evaluation of Dredged Material Proposed for Discharge in Inland and Near Coastal Waters - Testing Manual (referred to as the "Inland Testing Manual").
3. U.S. Army Corps of Engineers, U.S. Environmental Protection Agency. February 1991. Evaluation of Dredged Material Proposed for Ocean Disposal - Testing Manual (referred to as the "Green Book").
4. Clean Water Act, 40 CFR 230 (b)(1).
5. Marine Protection, Research and Sanctuaries Act of 1972.
6. U.S. Army Corps of Engineers. August 1993. Rogue River Sediment Evaluation, 1993. Portland District.
7. U.S. Army Corps of Engineers. August 1997. Rogue River Sediment Evaluation, 1997. Portland District.
8. U.S. Army Corps of Engineers. October 1988. Rogue Ocean Dredge Material Disposal Site Evaluation. Final Report. Portland District.
9. Navigation Branch, Operations Division, U. S. Army Corps of Engineers, Portland District. September 1991. Federal Navigation Projects: Columbia River Maintenance Disposal Plan. (Prepared by Mandaville Associates, 600 S. W. Tenth #418, Portland, Oregon 97205)
10. U.S. Army Corps of Engineers. April 1982. Sediment Physical and Chemical Characteristics Rogue River Federal Navigational Project: April 1992.
11. U.S. Army Corps of Engineers, U.S. Environmental Protection Agency. December 1992. Characteristics of Sediment at Gold Beach Boat Basin on the Rogue River, Final Report.

Physical Analysis & Volatile Solids

Sample ID	Grain Size (mm)		Percent			
	Median	Mean	Gravel	Sand	Clay/Silt	Volatile Solids
RR-P-1	0.03	0.04	0.00	11.15	88.85	9.37
RR-P-2	0.06	0.24	3.31	46.30	50.39	5.81
RR-P-3	0.16	0.70	10.80	71.35	17.86	2.87
RR-P-4	0.23	0.35	1.47	82.50	16.04	2.25
RR-P-5	NA	12.47	99.80	0.00	0.20	2.25
RR-P-6	0.18	0.16	0.00	99.86	0.14	1.70
RR-P-7	0.18	0.15	0.38	98.21	1.42	1.47
Minimum	0.03	0.04	0.00	0.00	0.14	1.47
Maximum	0.23	12.47	99.80	99.86	88.85	9.37

Table 3. Rogue River Federal Project

Sampled August 21, 2002

Inorganic Metals and TOC

Sample ID	As	Sb	Cd	Cu	Pb	Ni	Ag	Zn	Hg	TOC
	mg/kg (ppm)									
RR-P-1	4.89	0.5 J B1	0.297 J	42.9 B2	7.32 B2	201 B2	0.199 J	74 B2	0.0801	22000
RR-P-2	4.2	0.447 J B1	0.0467 J	34.5 B2	5.55 B2	194 B2	0.184 J	56.4 B2	0.0973	19900
RR-P-3	3.96	0.337 J B1	0.0617 J	36.4 B2	5.7 B2	277 B2	0.105 J	72.1 B2	0.0541	8070
RR-P-4	3.96	0.326 J B1	0.035 J	26.1 B2	4.51 B2	206 B2	0.0944 J	52.6 B2	0.049	4850
Screen Level (SL)	57	150	5.1	390	450	140	6.1	410	0.41	
<p>J = Estimated value (reported values are above the MDL, but below the PQL).</p> <p>B1 = Low-level contamination was present in the method blank (reported level was < 10 times blank concentration).</p> <p>B2 = Low-level contamination was present in the method blank (reported level was > 10 times blank concentration).</p> <p>(<) = Non-detect (ND) at the value listed (Method Detection Limit).</p>										

Table 4. Rogue River Federal Project

Sampled August 21, 2002

Pesticides, PCBs*, Phenols, Phthalates and Extractables

Sample ID	Pesticides				Phenols							Extractables	
	ug/kg (ppb)												
	4,4'-DDD	4,4'-DDE	4,4'-DDT	Total DDT	Phenol	3-&4 Methyl-phenol	Di-n-octyl-phthalate	bis(2-Ethylhexyl)-phthalate	Butylbenzyl - phthalate	Dimethyl-phthalate	Diethyl-phthalate	Benzoic Acid	Dibenzo - furan
RR-P-1	<.408	0.758 J	<.544	0.758	11.7 J	<4.04	<7.09	17	<5.18	<3	<4.64	<170	<3.16
RR-P-2	<.343	0.652 J	<.458	0.652	7.74 J	<3.39	<5.96	14.3	<4.36	<2.52	<3.9	<143	<2.66
RR-P-3	<.29	<.343	<.387	ND	4.81 J	<2.9	<5.09	13.6	<3.72	<2.15	<3.33	<122	<2.27
RR-P-4	<.243	<.288	<.324	ND	5.82 J	<2.52	<4.43	13.1	<3.24	<1.87	<2.9	<106	<1.98
Screen level	DDD +DDE + DDT = 6.9				420	670	6200	8300	970	1400	1200	650	540
(<) = Non-detect (ND) at the value listed (Method Detection Limit).													
J = Estimated value (reported values are above the MDL, but below the PQL).													

Polynuclear Aromatic Hydrocarbons (PAHs)
Low Molecular Weight Analytes
ug/kg (ppb)

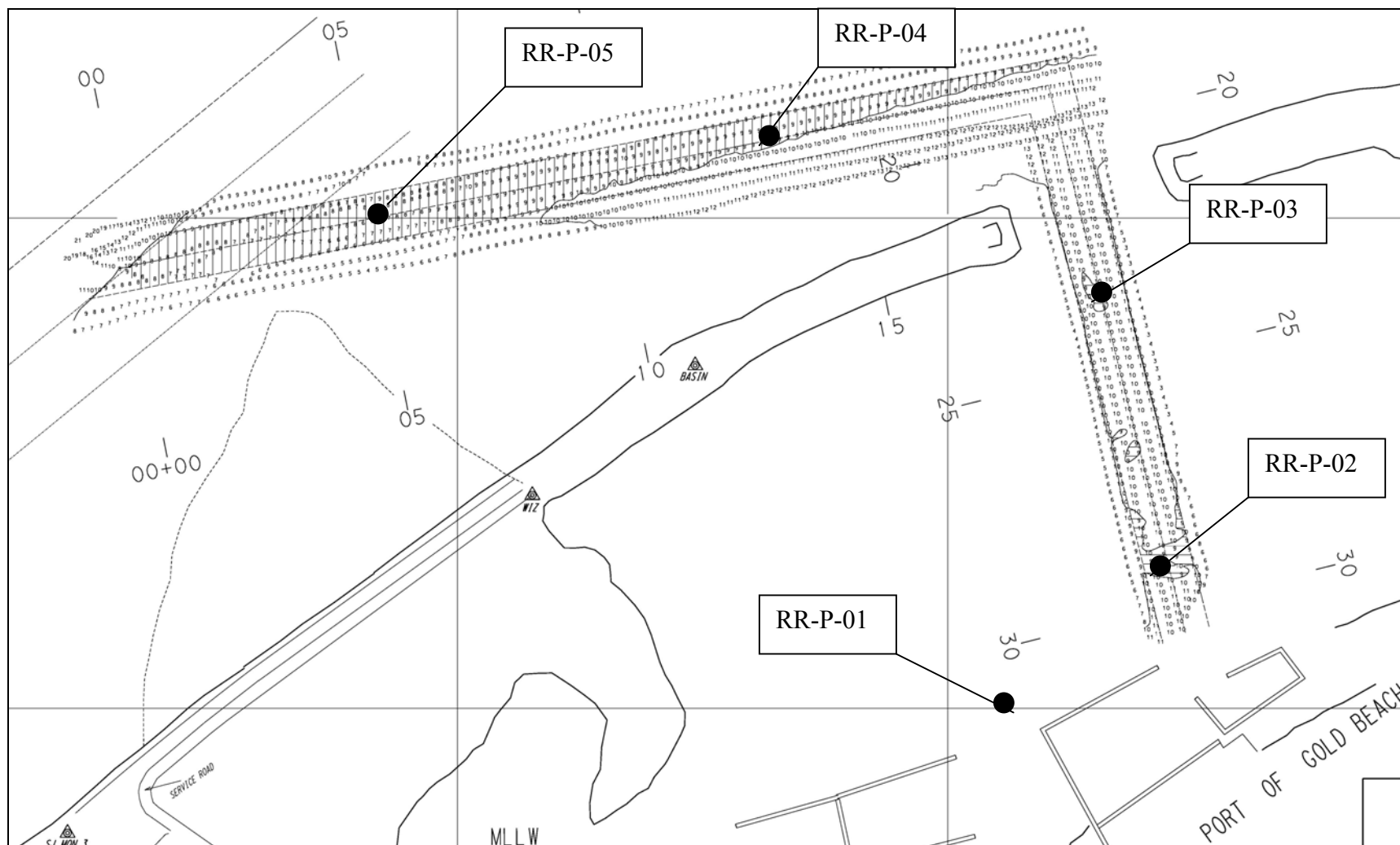
Sample ID	Acenaphthene	Acena- phthylene	Anthracene	Fluorene	2-Methyl naphthalene	Napthalene	Phenanthrene	Total Low PAHs
RR-P-1	<1.35	<1.19	2.94	1.58	3.14	2.4	6.26	16.32
RR-P-2	1.7	<1	<.578	1.65	7.48	4.46	4.71	20.0
RR-P-3	<.97	<.854	0.638	0.954	6.72	4.53	5.87	18.712
RR-P-4	<.843	<.743	<.429	<.796	5.65	2.37	2.55	10.57
Screen level:	500	560	960	540	670	2100	1500	5200
(<) = Non-detect (ND) at the value listed (Method Detection Limit).								

Polynuclear Aromatic Hydrocarbons (PAHs)
High Molecular Weight Analytes
ug/kg (ppb)

Sample ID	Benzo(a)-anthracene	Benzo-fluoroanthenes (b+k)	Benzo-(g,h,i)perylene	Benzo(a)-pyrene	Chrysene	Dibenz(a,h)-anthracene	Fluor-anthene	Indeno(1,2,3-c,d)pyrene	Pyrene	Total High PAHs
RR-P-1	2.87	8.44	1.51	3.42	6.68	<.635	7.88	1.92	6.49	39.21
RR-P-2	<1.4	3.32	<.378	3.6	<1.35	1.26	8.47	<.534	6.09	22.74
RR-P-3	<1.19	<.862	<.323	<1.15	3.73	<.456	7.37	<.456	4.6	15.7
RR-P-4	<1.04	<.75	<.281	<1	<1	<.397	<.796	<.397	<.562	ND
Screen level	1300	3200	670	1600	1400	230	1700	600	2600	12000
(<) = Non-detect (ND) at the value listed (Method Detection Limit).										

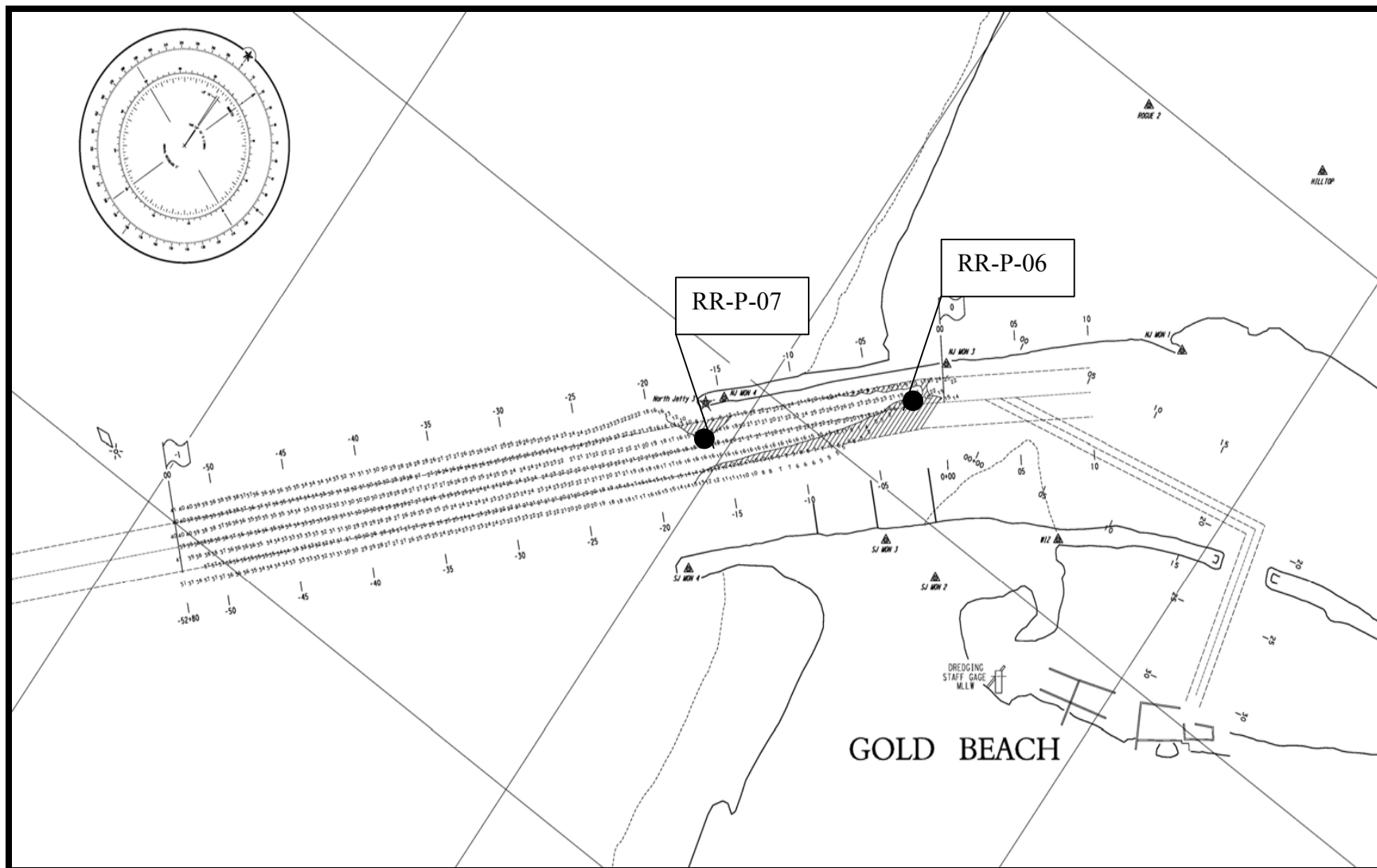
**Figure 1. Rogue River Federal Project
Sampling Site Locations**

Sampled August 21, 2002



**Figure 2. Rogue River Federal Project
Sampling Site Locations**

Sampled August 21, 2002



**Figure 3. Rogue River Federal Project
Vicinity Map**

